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ABSTRACT

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Memory Deficits in Learning Disabled Children

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Paper presented at the annual meeting of the American Psychological Association, August, 1978. Toronto, Ontario, Canada

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Abstract

Memory Deficits in Learning Disabled Children

John D. Nolan and Rosemary Driscoll

Memory storage and retrieval of learning disabled and normal children at two age levels (8-9 years and 11-12 years) were compared using a multitrial free recall paradigm. Stimuli were two lists of 20 high frequency nouns. Each list contained five categories, four words per category. Each child was tested individually on both lists on different days; one presentation was blocked, one random with counterbalancing of blocked and random lists across subjects. Mean IQ was 102 with no significant differences in mean or distribution among the four groups. The design was a 2 (LD vs normal) X 2 (age) X 5 (trials) factorial design. Older children performed better than younger; recall increased across trials and was higher with the blocked presentation. Normal children performed so much better than the learning disabled that the recall of the young normals and older LD was virtually indistinguishable. The difference came mainly from smaller recall units, though there were also fewer units recalled by the learning disabled.

Specific learning disability is still a mystery and a paradox despite the time, money, and energy which have been spent investigating this disorder in learning. It is a mystery in that we do not know what causes it. It is a paradox by definition. A child is considered learning disabled if he or she fails to perform in some school related subject at a level predicted by the child's ability, and if he or she is not lacking in motivation or exposure to instruction. But the most common measure of ability is IQ, and the most respected IQ scales, the Stanford-Binet and the Wechsler scales, depend to a great extent on what the testee has already learned. Prior learning demonstrates ability to learn and supposedly predicts ability to learn in the classroom. Yet, paradoxically, the learning disabled child does not learn school subjects at the rate at which he or she learns whatever one need know to achieve a particular score on the "intelligence" scales.

The solution to this paradox may lie in memory processes. The information which must be retrieved to answer correctly a question on an "intelligence" scale is information which is overlearned because the learner has had so many opportunities to learn it both in school and outside of school. The same is not true for learning which is strictly school learning. If children who are diagnosed as having a specific learning disability are constrained in how they store and retrieve information, this constraint might well retard their school learning.

We know very little about the memory functioning of Learning Disabled children in comparison to their normal peers. Freston and Drew (1974) and Parker, Freston and Drew (1975) have investigated short term memory in learning disabled children. Overall they found little difference between learning disabled and normal children, though the learning disabled were slightly poorer in retrieving more difficult words and took less advantage

of organizational factors. The wide range of ages in their studies and lack of control for IQ may have masked differences. Wilson (1977) compared learning disabled and normal children in 4th and 5th grades on a multi trial free recall task. Age and IQ were controlled. The stimulus list contained 12 unrelated words. He found no differences in either recall or subjective organization, but his data were collapsed across the 12 trials; this procedure could cover differences. Moreover, with unrelated items a natural organizational basis was lacking.

It seemed to us that most information in the real world of school can be and usually is organized. We set out to create a free recall task which would permit the children to organize information while learning and allow us to measure both organization and amount of recall. We expected to find both organizational and amount of recall differences between learning disabled and normal children. Furthermore, we wanted to look at developmental differences.

Methodology

We match children in a school for the learning disabled with children in a regular school for age and IQ. We used two age levels, 8-9 year olds and 11-12 year olds. Mean IQ was 101.8 with no significant differences in mean or distribution between the four groups. There were ten children in each group.

From Battig and Montague's Category Norms in 56 categories we constructed two lists of 20 high frequency nouns. Each list contained five categories with four items per category.

The children were tested individually on both lists. They listened to a taped presentation through headphones. Rate was one word every 3 seconds. There were five learning and recall trials for each list. Each child heard

a blocked presentation of one list and a random presentation of the other. One week elapsed between presentations. Lists and the random vs. blocked presentations were counterbalanced across subjects. Word order varied across trials. Recall was oral. When the subject had not responded for 5 seconds the recall was read back, and then any additional responses were recorded.

Results and Discussion

The design was a 2 (LD vs normal) X 2 (age) X 2 (blocked vs. random) X 5 (trials) factorial with repeated measures on the last two variables. Figure 1 shows mean number of words recalled under the blocked condition, figure 2 under the random condition. The main effects for trials, $F(4,144) = 78.94, p < .001$, for condition, $F(1,36) = 24.75, p < .001$, and for age, $F(1,36) = 5.26, p < .05$, are not terribly interesting. Such effects are usually found in free recall learning studies with children. The main effect of considerable interest is the main effect for population, $F(1,36) = 7.57, p < .01$. There were no statistically significant interactions ($\alpha = .05$). Note that the performance of the older learning disabled children is almost the same as that of the younger normal children. This means that there is a three year lag in development of effective use of long term memory among learning disabled children.

Organization was measured using the relative ratio of repetition, $r.r.r. = R/(W-C)$, where R = number of pairs of contiguously recalled words from the same category, W = number of words recalled, and C = number of categories from which the words were recalled. As is usually the case, there was greater clustering under the blocked condition than under the random, $F(1,36) = 67.8, p < .001$, and clustering increased across trials, $F(4,144) = 3.06, p < .05$. There was no main effect for age. Increase in

clustering with increasing age is sometimes found, sometimes not. Confer Jablonsky (1972) for a review on this point. There were no interactions, and, somewhat surprising to us, no significant difference in clustering between normal and learning disabled children.

What, then, caused the difference in recall? The learning disabled children retrieved fewer words per category than normal children, $F(1,36) = 4.91$, $p < .05$. If one assumes with Mandler (1967) that learning and organization are closely related, then one concludes that the learning disabled child forms smaller learning units, that is, utilizes less information while learning, than his or her normal peer. In line with Mandler's (1967) contention that unitization of categories follows the same law as unitization of category members, the learning disabled also retrieved fewer categories, $F(1,36) = 9.16$, $p < .01$. Since there were no age differences in category retrieval, i.e., no main effect for age, it would seem that it truly is size of unit which differentiates normal and learning disabled children.

If these laboratory results are generalized to the classroom, the educational implications are important. First, we must consider the smaller learning units which the learning disabled are capable of forming and adjust instruction accordingly. Secondly, we may have to make an adjustment in our perspective of developmental level by considering the large developmental lag in the memory functioning of learning disabled children.

The results reported here do not address the mystery of learning disability, but may suggest a way to resolve the paradox. Where there is not overlearning, the learning disabled perform more poorly. Where there is overlearning, perhaps learning disabled and normals do not differ. But that is another investigation.

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Fig. 1

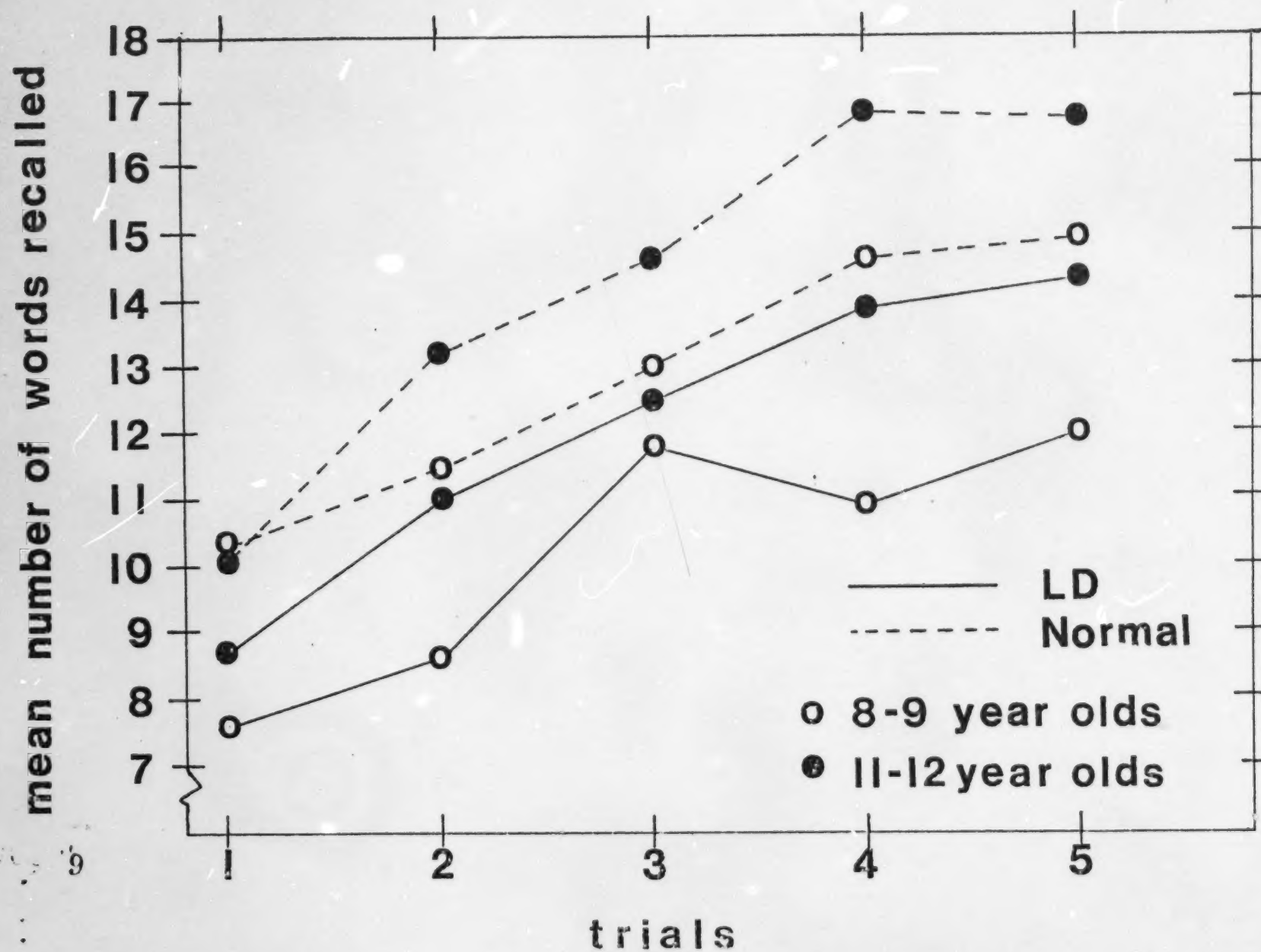


Fig. 2

